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PATENT LAW, COPYRIGHT LAW, AND THE GIRL GERMS EFFECT

ANN BARTOW[†]

INTRODUCTION

Inventors¹ pursue patents and authors² receive copyrights. No special education is required for either endeavor, and nothing precludes a person from being both an author and an inventor. Inventors working on patentable industrial projects geared toward commercial exploitation tend to be scientists or engineers. Authors, with the exception of those writing computer code,³ tend to be educated or trained in the creative arts, such as visual art, performance art, music, dance, acting, creative writing, film making, and architectural drawing. There is a well-warranted societal supposition that most of the inventors of patentable inventions are male.⁴ Assumptions about the genders of the authors of remunerative commercially exploited copyrights may be less rigid. Women authors are more broadly visible than women inventors across most of the typical categories of copyrightable works.

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¹ 35 U.S.C. § 100(f) (2012) (“The term ‘inventor’ means the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention.”).

² 17 U.S.C. § 102(a) (2012). “Authors” is the term used by the U.S. Copyright Act to refer to people or entities who produce copyrightable “original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.” *Id.*

³ U.S. COPYRIGHT OFFICE, COPYRIGHT REGISTRATION FOR COMPUTER PROGRAMS (Aug. 2012), <http://www.copyright.gov/circs/circ61.pdf>.

⁴ Michelle Chen, *80 Percent of Patents Belong Solely to Men*, THE NATION (Aug. 12, 2016), <https://www.thenation.com/article/80-percent-of-patents-belong-solely-to-men>.

Yet, whether one considers patentable inventions or copyrightable works, the vast majority of the very profitable ones are both originated and controlled by men.⁵ This causes a host of negative consequences for women. They start and run businesses at much lower rates than men and rarely reach elite leadership levels in the corporate world or within high-profile artistic or cultural communities.⁶ They are perceived as less competent, less dedicated, and less hard working, and suffer from a lack of female mentors and female colleagues.⁷ Women are lied to during financial negotiations more than men⁸ and earn less than men in equivalent positions.⁹ Women control only a tiny portion of the world's wealth.¹⁰ Though female students outperform male students in almost every context and at almost

⁵ This Essay will not cover gender and trademark issues but notes that data publicized by the National Women's Business Council suggested that "[w]omen received a third of trademarks issued to individuals, twice the share of 30 years ago," which it asserted indicates "rising entrepreneurship among . . . women." Susan Decker, *Women Inventors Double Their Share of Patents*, BLOOMBERG (Mar. 1, 2012, 10:17 AM), <http://www.bloomberg.com/news/articles/2012-03-01/women-inventors-double-their-share-of-patents>.

⁶ See, e.g., Matt Egan, *Still Missing: Female Business Leaders*, CNNMONEY (Mar. 24, 2015, 1:49 PM), <http://money.cnn.com/2015/03/24/investing/female-ceo-pipeline-leadership>; Judith Warner, *Fact Sheet: The Women's Leadership Gap*, CTR. FOR AM. PROGRESS (Mar. 7, 2014), <https://www.americanprogress.org/issues/women/report/2014/03/07/85457/fact-sheet-the-womens-leadership-gap>.

⁷ See, e.g., *Catalyst Study Exposes How Gender-Based Stereotyping Sabotages Women in the Workplace*, CATALYST (2005), <http://www.catalyst.org/media/catalyst-study-exposes-how-gender-based-stereotyping-sabotages-women-workplace>; E.W., *Women and Work: What's Holding Women Back?*, THE ECONOMIST (Jan. 23, 2015), <http://www.economist.com/blogs/democracyinamerica/2015/01/women-and-work>; Birute Regine, *Why Is It That Women Are Seen as Less Competent?*, FORBES (Apr. 14, 2011, 10:30 AM), <http://www.forbes.com/sites/85broads/2011/04/14/why-is-it-that-women-are-seen-as-less-competent>.

⁸ Laura J. Kray, Jessica A. Kennedy & Alex B. Van Zant, *Not Competent Enough To Know the Difference? Gender Stereotypes About Women's Ease of Being Misled Predict Negotiator Deception*, 125 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 61, 68–69 (2014); Bryce Covert, *Everyone Lies to Women in Negotiations*, THINKPROGRESS (Aug. 1, 2014), <http://thinkprogress.org/economy/2014/08/01/3466245/women-negotiations-lie>; Jenny Kutner, *Women Get Ripped off Because People Lie to Them*, SALON (Aug. 4, 2014, 12:44 PM), http://www.salon.com/2014/08/04/women_get_ripped_off_because_people_lie_to_them.

⁹ See Warner, *supra* note 6; see generally AM. ASS'N OF UNIV. WOMEN, THE SIMPLE TRUTH ABOUT THE GENDER PAY GAP 1–5, 16 (Spring 2016), http://www.aauw.org/files/2016/02/SimpleTruth_Spring2016.pdf.

¹⁰ Sudeep Reddy, *New Facts on the Gender Gap from the World Bank*, WALL ST. J. (Sept. 18, 2011, 8:50 PM), <http://blogs.wsj.com/economics/2011/09/18/new-facts-on-the-gender-gap-from-the-world-bank>.

every level of education,¹¹ and even seek postdegree job-related training in greater numbers than men,¹² this has not helped women to produce and control patentable inventions or to author and own valuable copyrighted works in numbers comparable to men.

¹¹ See, e.g., Daniel Voyer & Susan D. Voyer, *Gender Differences in Scholastic Achievement: A Meta-Analysis*, 140 PSYCHOL. BULL. 1174, 1189 (2014), <http://www.apa.org/pubs/journals/releases/bul-a0036620.pdf>; Allie Grasgreen, *The Rise of Women*, INSIDE HIGHER ED (Feb. 21, 2013), <https://www.insidehighered.com/news/2013/02/21/new-book-explains-why-women-outpace-men-education>; Jesse Singal, *In Most Places, Girls Are Better Students than Boys*, N.Y. MAG.: SCI. OF US (Jan. 27, 2015, 11:29 AM), <http://nymag.com/scienceofus/2015/01/most-places-girls-are-better-students.html>; Camilla Turner, *Girls Do Better than Boys at School, Despite Inequality*, THE TELEGRAPH (Jan. 22, 2015, 9:10 PM), <http://www.telegraph.co.uk/education/11364130/Girls-do-better-than-boys-at-school-despite-inequality.html>; Daniel Voyer, *Girls Make Higher Grades than Boys in All School Subjects, Analysis Finds*, AM. PSYCHOL. ASS'N (Apr. 29, 2014), <http://www.apa.org/news/press/releases/2014/04/girls-grades.aspx>; *Why Girls Do Better at School than Boys*, THE ECONOMIST: THE ECONOMIST EXPLAINS (Mar. 6, 2015, 12:17 AM), <http://www.economist.com/blogs/economist-explains/2015/03/economist-explains-3>; see also Gijsbert Stoet & David C. Geary, *Sex Differences in Academic Achievement Are Not Related to Political, Economic, or Social Equality*, 48 INTELLIGENCE 137, 137 (2015), <http://www.sciencedirect.com/science/article/pii/S0160289614001688> (“The national differences in gender equality in economic and political participation have garnered considerable attention as an explanation of boys’ better achievement in mathematics in most countries, but the debate is far from resolved. Using data from four international assessments of the academic achievement of 1.5 million 15 year olds (Programme for International Student Assessment, PISA), we demonstrate that the relation between sex differences in PISA achievement and national measures of gender equality is not consistent across assessments, and several of the positive findings are confounded by outliers. Further, for overall achievement across reading, mathematics, and science literacy girls outperformed boys in 70% of participating countries, including many with considerable gaps in economic and political equality, and they fell behind in only 4% of countries. The results raise doubts about the relation between national equality policies and mathematics achievement, and raise broader questions regarding women’s underrepresentation in political, economic, and academic leadership despite stronger academic skills and regarding the long-term economic prospects and social stability of nations with many men who are not competitive in the modern economy.”).

¹² John B. Horrigan, *Almost Two-Thirds of Employed Adults Pursue Job-Related Learning*, PEWRESEARCHCENTER (Mar. 22, 2016), <http://www.pewinternet.org/2016/03/22/almost-two-thirds-of-employed-adults-pursue-job-related-learning> (“Moreover, there are some other noteworthy demographic differences among those who are professional learners. Those with college degrees or more, women, and those in the middle and upper income ranges are more likely to have done some professional learning in the past year.”).

In the United States, the majority of college graduates generally, and arts and humanities graduates particularly, are women.¹³ American men, though they attend colleges and universities in significantly smaller numbers than women, continue to dominate the so-called STEM—Science, Technology, Engineering, and Math—disciplines.¹⁴ These gender disparities are observable when women and men first begin preparing for their careers. Beginning in middle and high school and continuing through college and graduate school, males are more likely to major in science while females are more likely to major in creative arts:

Even though the [New York City] Department of Education has created special programs designed to attract more girls to its schools that specialize in math and science, boys continue to outnumber girls in these schools by a wide-margin. And for the middle and high schools that concentrate on music, fine arts, dance and theatre, there are no such citywide programs designed to attract more boys. Consequently, girls outnumber boys at arts schools by an even greater margin.

An analysis of gender ratios in these specialized schools over the last five years shows that math and science-focused schools are on average 58 percent male and 42 percent female. These percentages have remained virtually unchanged since the 2010 school year. Schools that specialize in the arts, on the other hand, are now 64 percent female and 36 percent male, a disparity that has grown slightly larger over the last five years.¹⁵

¹³ *Female Graduation Rates: Degrees of Equality*, THE ECONOMIST: GRAPHIC DETAIL (Sept. 13, 2011, 2:45 PM), <http://www.economist.com/blogs/dailychart/2011/09/female-graduation-rates>.

¹⁴ Laurel Raymond, *Even with Hard Evidence of Gender Bias in STEM Fields, Men Don't Believe It's Real*, THINKPROGRESS (Oct. 19, 2015), <http://thinkprogress.org/health/2015/10/19/3713612/men-ignore-hard-evidence-of-gender-bias>.

¹⁵ Pola Lem, Arianna Skibell & Jessica Husseman, *Big Gender Gap Persists in Arts Schools, and Math and Science Schools. Why?*, SCH. STORIES: EDUC. REPORTING IN N.Y.C. (June 9, 2015), <http://school-stories.org/2015/06/gender-disparities-found-in-many-of-new-york-citys-science-math-schools-and-arts-communication-schools>.

This gendered career preparation phenomenon is international.¹⁶ So is the fact that while the underrepresentation of women in STEM fields is usually viewed as a problem that needs addressing, the underrepresentation of men in creative arts fields almost never is. Rarely indeed does anyone express concerns about a dearth of men in the copyrightable arts pipeline. It is as if there is at least subconscious recognition of the possibility that men need to work together in large numbers to continue to dominate STEM-focused environments, and the reality that men can, and usually do, rise to the top of creative fields even if the majority of their peers and competitors are females with superior educational credentials.

I. PATENTS: WOMEN ARE UNDERREPRESENTED IN OCCUPATIONS THAT TYPICALLY LEAD TO PATENTS

Though women in most STEM fields outearn their female peers in other occupations by as much as 33%,¹⁷ women are significantly underrepresented in STEM jobs:

According to the Census Bureau's 2009 American Community Survey (ACS), women comprise 48 percent of the U.S. workforce but just 24 percent of STEM workers. In other words, half as many women are working in STEM jobs as one might expect if gender representation in STEM professions mirrored the overall workforce.

¹⁶ THE ECONOMIST: GRAPHIC DETAIL, *supra* note 13 (“[F]emale graduates greatly outnumber male graduates. Overall they account for 58% of graduates within OECD member states in 2009, the most recent year for which data are available, up from 54% in 2000. Men, however, continue to dominate the sciences: some 60% of science graduates are male. Women make up almost three-quarters of the graduate body in health and welfare, and almost two-thirds in humanities and the arts.”).

¹⁷ DAVID BEEDE ET AL., U.S. DEPT OF COMMERCE, ISSUE BRIEF NO. 04-11, WOMEN IN STEM: A GENDER GAP TO INNOVATION 4 (2011), <http://www.esa.doc.gov/sites/default/files/womeninstemagaptoinnovation8311.pdf> (“[A]ll else being equal, women in STEM jobs earn 33 percent more than their female peers in other jobs, while the STEM premium for men is 25 percent.”). *But see* Renee Davidson, *Even in High-Paying STEM Fields, Women Are Shortchanged*, AM. ASS'N OF UNIV. WOMEN (Apr. 14, 2015), <http://www.aauw.org/2015/04/14/women-shortchanged-in-stem> (“An AAUW analysis of the U.S. Census Bureau's 2013 American Community Survey data found that overall, women in computer and mathematical occupations were paid 87 percent of what their male counterparts were paid. And in engineering and architecture, women were typically paid 82 percent of what their male counterparts were paid, or about \$65,000 annually, compared to \$79,000 for men. It seems that entering a high-paying field like engineering or computing still does not protect women against the pay gap.”).

This underrepresentation has remained fairly constant over the past decade, even as women's share of the college-educated workforce has increased.¹⁸

Women remain underrepresented in inventive occupations despite some successful small-scale interventions aimed at increasing their numbers,¹⁹ and are far less likely to be named as inventors in valuable patents.²⁰ Biology is the sole area of science that women study at higher rates than men.²¹ Biology is also the lowest-paying field that offers inventive jobs.²² In fact, "[a]bout 58 percent of all bachelor's, master's and doctorates in biology are awarded to women. But except for medical students, salary prospects are lower in biology, and research jobs, the most coveted of pursuits, hard to come by."²³ Recent data confirms a continuing surplus of biology Ph.D.'s hoping to become

¹⁸ BEEDE ET AL., *supra* note 17, at 2 (citation omitted).

¹⁹ See, e.g., Valerie Strauss, *How To Get Girls More Interested in STEM Subjects*, WASH. POST (Sept. 15, 2014), <https://www.washingtonpost.com/news/answer-sheet/wp/2014/09/15/how-to-get-girls-more-interested-in-stem-subjects> ("In an experiment now underway at Stanford University, researchers Brian Perone and Michelle Friend are using a virtual reality classroom, complete with virtual 'classmates,' to investigate the effect of student gender ratio on young women's ability to absorb and remember computer science course material, as well as their interest in taking more classes in the subject. Preliminary results suggest that female students learn better when they are surrounded by female classmates—even virtual ones—and the more women in the room, the better. Perone's and Friend's findings suggest that the reason behind the success of the Online School for Girls may not be its stated emphasis on teaching girls differently, but simply the fact that its students know that their classmates are girls like them."); see also Barbara Axelson, *Girls Gone Wild—For Science!*, SCHOLASTIC ADM'R, <http://www.scholastic.com/browse/article.jsp?id=3748784> (last visited Dec. 20, 2016); Ashley D. Rittmayer & Margaret E. Beier, *Overview: Self-Efficacy in STEM*, AWEONLINE.ORG (2008), http://www.engr.psu.edu/awe/misc/arps/arp_selfefficacy_overview_122208.pdf.

²⁰ Adrienne LaFrance, *Why Do Women Inventors Hold so Few Patents?*, THE ATLANTIC (July 21, 2016), <http://www.theatlantic.com/technology/archive/2016/07/the-patent-gap/492065>.

²¹ Christopher Drew, *Where the Women Are: Biology*, N.Y. TIMES (Nov. 4, 2011), <http://www.nytimes.com/2011/11/06/education/edlife/where-the-women-are-biology.html>.

²² See *id.* ("More than 86,000 biology majors graduate each year, to compete for entry-level positions in research, environmental monitoring, health care and teaching. Salaries start at \$40,000 to \$50,000 a year, college placement offices say, compared with \$55,000 to \$65,000 for graduates in computer fields and engineering. Spending six or more years to earn a doctorate doesn't pay off, either. There is such a glut of biology Ph.D.'s that only 14 percent find tenure-track academic jobs within six years.").

²³ *Id.*

professors,²⁴ but while “[52%] of biology Ph.D.s are women . . . their representation shrinks to 39[%] at the postdoc level, and only 18[%] at the tenured professor level.”²⁵

Some researchers, usually but not always male, will explain that the apparent allure of the biology field to women, at least at the entry level, is related to a gender-linked desire to help people.²⁶ Other researchers, however, tie the relative popularity of biology to discrimination against women in other areas of science, such as physics:

Both male and female scientists view gender discrimination as a factor in women deciding to choose biology over physics. Approximately half of all the scientists we interviewed thought that, at some point during their education, women are discouraged from pursuing a career in physics. However, during interviews, men almost never mentioned present-day discrimination, believing that any discrimination in the physical sciences likely took place in primary school. Female scientists, on the other hand, believe they still face discrimination once they are working in university science departments.²⁷

Men are more likely to attribute the scarcity of women in fields of science, such as physics, to some innate inadequacy of the female brain, while women will attribute it to discrimination,²⁸ with good reason: “One landmark study found that science faculty at research universities rate applicants with male names as more competent, more hireable, and more deserving of a higher starting salary than female applicants, even when the r[é]sum[é]s are otherwise identical.”²⁹ Female scientists may be

²⁴ See Yi Xue & Richard C. Larson, *STEM Crisis or STEM Surplus? Yes and Yes*, MONTHLY LAB. REV., May 2015, at 1.

²⁵ Jane C. Hu, *Old Boys' Lab: Where Are the Women in America's Greatest Scientific Laboratories?*, SLATE: DOUBLEX (June 30, 2014, 3:15 PM), http://www.slate.com/articles/double_x/doublex/2014/06/women_in_science_a_new_study_on_how_male_professors_discriminate_against.html.

²⁶ See Drew, *supra* note 21.

²⁷ Elaine Howard Ecklund, *Why Scientists Think There Are More Women in Biology than Physics*, SOCIOLOGISTS FOR WOMEN IN SOC'Y: GENDER & SOC'Y BLOG (Sept. 13, 2013, 2:50 PM), <https://gendersociety.wordpress.com/2013/09/13/why-scientists-think-there-are-more-women-in-biology-than-physics>.

²⁸ See *id.*

²⁹ Raymond, *supra* note 14; see also Corinne A. Moss-Racusin et al., *Science Faculty's Subtle Gender Biases Favor Male Students*, 109 PROC. NAT'L ACAD. SCI. U.S. 16474, 16474 (2012) (“Despite efforts to recruit and retain more women, a stark gender disparity persists within academic science. Abundant research has demonstrated gender bias in many demographic groups, but has yet to

further disadvantaged when letters of recommendation are read in conjunction with résumés:

[A] 2008 study of 886 letters of recommendations for faculty positions in chemistry showed that these letters tended to include descriptors of ability for male applicants, such as “standout,” but refer to the work ethic of the women, rather than their ability, by using words such as “grindstone.”

A similar study showed that female, but not male, students applying for a research grant had letters of recommendation emphasizing skills such as the applicants’ ability to care for an elderly parent or to balance the demands of parenting and research.

Furthermore, a 2009 analysis of 194 applicants to research faculty positions in psychology found that letters of recommendation for women used more “communal” adjectives (like helpful, kind, warm and tactful), and letters of recommendation for men used more decisive adjectives (like confident, ambitious, daring and independent), even after statistically controlling for different measures of performance.

Perhaps not surprisingly, a follow-up experiment in the same paper found that these subtle differences in the language can result in female candidates being rated as less hireable than men.³⁰

experimentally investigate whether science faculty exhibit a bias against female students that could contribute to the gender disparity in academic science. In a randomized double-blind study ($n = 127$), science faculty from research-intensive universities rated the application materials of a student—who was randomly assigned either a male or female name—for a laboratory manager position. Faculty participants rated the male applicant as significantly more competent and hireable than the (identical) female applicant. These participants also selected a higher starting salary and offered more career mentoring to the male applicant. The gender of the faculty participants did not affect responses, such that female and male faculty were equally likely to exhibit bias against the female student. Mediation analyses indicated that the female student was less likely to be hired because she was viewed as less competent. We also assessed faculty participants’ preexisting subtle bias against women using a standard instrument and found that preexisting subtle bias against women played a moderating role, such that subtle bias against women was associated with less support for the female student, but was unrelated to reactions to the male student. These results suggest that interventions addressing faculty gender bias might advance the goal of increasing the participation of women in science.”); Ilana Yurkiewicz, *Study Shows Gender Bias in Science Is Real. Here’s Why It Matters*, SCI. AM.: UNOFFICIAL PROGNOSIS BLOG (Sept. 23, 2012), <http://blogs.scientificamerican.com/unofficial-prognosis/study-shows-gender-bias-in-science-is-real-heres-why-it-matters>.

³⁰ Cynthia Leifer et al., *Boys Club? The Truth About Discrimination in Science, from Six Female Professors*, QUARTZ (Aug. 7, 2015), <http://qz.com/473961/the-truth-about-discrimination-in-science-from-six-female-professors>; see generally Toni

If the main issue is gender bias within the STEM professions, addressing only pipeline problems will not increase the number of women staying and succeeding in inventive positions in STEM fields.³¹ It is also important to consider the ways that race-based biases can compound the associative hardships for women scientists who are not white.³² If they are confronted by both racism and sexism, talented women of color may be especially difficult to retain. No one enjoys working someplace where she feels unwelcome:

When researcher Kieran Snyder interviewed 716 women who left tech after an average tenure of 7 years, almost all of them said they liked the work itself, but cited discriminatory environments as their main reason for leaving. In NSF-funded research, Nadya Fouad surveyed 5,300 women who had earned engineering degrees (of all types) over the last 50 years, and 38% of them were no longer working as engineers. Fouad summarized her findings on why they leave with “It’s the climate, stupid!”³³

Software engineering is currently a popular and remunerative field.³⁴ Yet the proportion of female software engineers has actually decreased over time. According to the National Center for Women & Information Technology, in 2014 just 17% of computer-science college graduates were women,

Schmader et al., *A Linguistic Comparison of Letters of Recommendation for Male and Female Chemistry and Biochemistry Job Applicants*, 57 SEX ROLES 509 (2007), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2572075>.

³¹ See Joan C. Williams, *The 5 Biases Pushing Women out of STEM*, HARV. BUS. REV.: GENDER (Mar. 24, 2015), <https://hbr.org/2015/03/the-5-biases-pushing-women-out-of-stem>.

³² See JOAN C. WILLIAMS ET AL., CTR. FOR WORKLIFE LAW, DOUBLE JEOPARDY? GENDER BIAS AGAINST WOMEN OF COLOR IN SCIENCE 4 (2014), <http://www.uchastings.edu/news/articles/2015/01/double-jeopardy-report.pdf>.

³³ Rachel Thomas, *If You Think Women in Tech Is Just a Pipeline Problem, You Haven’t Been Paying Attention*, MEDIUM.COM: TECH DIVERSITY FILES (July 27, 2015), <https://medium.com/tech-diversity-files/if-you-think-women-in-tech-is-just-a-pipeline-problem-you-haven-t-been-paying-attention-cb7a2073b996#.tfp54c2do>; see also Tess C. Taylor, *PayScale Gender Report Reveals Female Software Engineers Get Paid 12% Less*, PAYSCALE.COM: COMPENSATION TODAY (June 8, 2015), <http://www.payscale.com/compensation-today/2015/06/payscale-gender-report-reveals-female-software-engineers-get-paid-12-less>.

³⁴ See, e.g., Aaron Skonnard, *The Top 5 Highest-Paying Tech Jobs in 2015*, INC.: PERSONAL FINANCE (Mar. 10, 2015), <http://www.inc.com/aaron-skonnard/the-top-5-highest-paying-tech-jobs-in-2015.html>.

down from 37% in 1985.³⁵ Not surprisingly, “[i]n 2015, women held 57% of all professional occupations, yet they held only 25% of all computing occupations.”³⁶

II. GENDER AND PATENTING: SOME NUMBERS

In 2015, a study of gender disparities in patenting found that based on data from the USPTO, between 1976 and 2013, “women’s rate of patenting has increased from 2.7% of total patenting activity to 10.8%.”³⁷ This may suggest that the gender disparity in patenting has decreased somewhat, but Annette Kahler has pointed out that the data collected and distributed by the USPTO on which these percentages are based has some limitations.³⁸

The study also reported that “in every technological area, female patenting is proportionally more likely to occur in academic institutions than in corporate or government environments.”³⁹ This probably has negative impacts upon the financial rewards that women receive for successfully patenting their inventions, as universities usually pay lower salaries than corporations, and are less likely to reward patenting with raises or bonuses.⁴⁰ Finally, the study further ascertained that “women’s patents have a lower technological impact than that of men, and that gap is wider in the case of academic patents,” and

³⁵ NCWIT *Fact Sheet*, NAT’L CTR. FOR WOMEN & INFO. TECH., <https://www.ncwit.org/ncwit-fact-sheet> (last visited Dec. 20, 2016); Claire Cain Miller, *Some Universities Crack Code in Drawing Women to Computer Science*, N.Y. TIMES (July 17, 2014), <http://www.nytimes.com/2014/07/18/upshot/some-universities-crack-code-in-drawing-women-to-computer-science.html>.

³⁶ CATHERINE ASHCRAFT ET AL., NAT’L CTR. FOR WOMEN & INFO. TECH., WOMEN IN TECH: THE FACTS 2 (2016), https://www.ncwit.org/sites/default/files/resources/ncwit_women-in-it_2016-full-report_final-web06012016.pdf.

³⁷ Cassidy R. Sugimoto et al., *The Academic Advantage: Gender Disparities in Patenting*, PLOS ONE, May 27, 2015, at 1, 1, <http://journals.plos.org/plosone/article/asset?id=10.1371/journal.pone.0128000.PDF>.

³⁸ Annette I. Kahler, *Examining Exclusion in Woman-Inventor Patenting: A Comparison of Educational Trends and Patent Data in the Era of Computer Engineer Barbie*, 19 AM. U. J. GENDER SOC. POL’Y & L. 773, 783–84 (2011).

³⁹ Sugimoto et al., *supra* note 37, at 1.

⁴⁰ Paul R. Sanberg et al., *Changing the Academic Culture: Valuing Patents and Commercialization Toward Tenure and Career Advancement*, 111 PROC. NAT’L ACAD. SCI. 6542, 6543 (2014); *see generally* Mario Cervantes, *Academic Patenting: How Universities and Public Research Organizations Are Using Their Intellectual Property To Boost Research and Spur Innovative Start-Ups*, WORLD INTELLECTUAL PROP. ORG., http://www.wipo.int/sme/en/documents/academic_patenting.html (last visited Dec. 20, 2016).

“that patents to which women—and in particular academic women—contributed are associated with a higher number of International Patent Classification (IPC) codes and co-inventors than [those to which] men [contributed].”⁴¹

The gender disparity in patenting phenomenon is also international. The study authors noted, “Male dominance in patenting is found in nearly every country, with 42 countries listing no female inventors.”⁴² The study found that women’s rate of obtaining patents is even lower than their representation in STEM fields—where they represent about 33% of researchers—and their rate of authorship of scientific papers—about 30%.⁴³ The study authors observed:

Patenting, of course, does not encompass the entire spectrum of innovative activities. However, women seem to be at a disadvantage across this spectrum: while they might be included on publications related to the patent, women’s names disappear between the article about the patent and the patent itself and even fewer women see the commercialization and licensing of their patents.⁴⁴

Because the patenting process does not record the gender of listed inventors, investigators have to make assumptions about gender based on first names.⁴⁵ Some women inventors may use initials rather than feminine-sounding first names to try to avoid gender bias during patent prosecutions, but this would not explain why their names would not be listed as inventors on related patents after appearing as authors of articles disclosing the research results undergirding the patent applications.

Even after women have emerged through the pipeline and secured STEM jobs, they may lack the institutional support they need to thrive. A dearth of mentors and exclusion from informal networks can make it difficult for women to navigate unwritten company rules and norms:

One potential reason for low rates of patenting is that, in most companies, patenting is not a very transparent process. A lot of

⁴¹ Sugimoto et al., *supra* note 37, at 1.

⁴² *Id.* at 5 (citation omitted).

⁴³ *Id.* at 8.

⁴⁴ *Id.* (footnote omitted).

⁴⁵ CATHERINE ASHCRAFT & ANTHONY BREITZMAN, NAT’L CTR. FOR WOMEN & INFO. TECH., WHO INVENTS IT? WOMEN’S PARTICIPATION IN INFORMATION TECHNOLOGY PATENTING 6 (2012), https://www.ncwit.org/sites/default/files/resources/2012whoinventsit_web_1.pdf.

informal knowledge and support is required for employees to figure out if their idea is even worth patenting and if so how to go about obtaining a patent. Because women and other underrepresented groups typically have less access to the informal networks that often provide this kind of tacit information, they may face more difficulty in determining whether and how to go about patenting.⁴⁶

Within the specific context of software development, there are very few women in technology leadership roles or related positions that have a significant influence on future innovation. Research suggests “88% of all information technology patents (from 1980–2010) are invented by male-only invention teams while only 2% are invented by female-only invention teams.”⁴⁷ This may be because even those women who stay in the software industry may be channeled into less inventive environments within their companies:

Another potential reason that women are even more underrepresented in technology patenting than in technology more broadly may be the kinds of technical roles women typically hold. . . . [W]omen in one study reported that men more frequently occupy the creative and innovative roles while women are more frequently channeled or clustered into execution roles. These women reported difficulties in accessing the more innovative tasks, assignments, and occupations.⁴⁸

Even after a woman submits a patent application, her gender may be an obstacle to becoming a patented inventor. There is some data that suggests patent applications by women inventors are judged more harshly than those submitted by men. One 2015 study concluded that both female and male patent examiners tend to favor male inventors and judge applications listing women as inventors more harshly:

Male examiners tend to favor male inventors by 6%. However, in perhaps our most surprising discovery, our data showed that female examiners also statistically favor male inventors by

⁴⁶ ASHCRAFT ET AL., *supra* note 36, at 13 (citation omitted).

⁴⁷ *Id.* at 2; *see also id.* at 12 (citation omitted) (“[A]n NCWIT study of all U.S. invented U.S. information technology patents found that, depending on the subcategory, male-only teams account for 82–90 percent of all information technology patents. Female-only teams account for approximately 2 percent while mixed-sex teams count for 8–15 percent. As a result, women are even more underrepresented in technology patenting than they are in the technology workforce overall.”).

⁴⁸ *Id.* at 13 (citation omitted).

nearly the same amount. In fact, female examiners approve applications by female inventors only 57.9% of the time. That represents the lowest rate among the four possible combinations. To look at it another way, male applicants assigned to male examiners have the highest likelihood of success.⁴⁹

Women inventors might benefit from the same sort of blind review practices that can help women academics overcome gender bias directed at their scholarly papers.⁵⁰ When gender is hidden, women academics can have an improved chance of their research being viewed positively.⁵¹

The gender of the person prosecuting a patent may also be an important variable. Saurabh Vishnubhakat has mapped and described in detail the lack of gender diversity in the Patent Bar.⁵² As a general matter, it is always better to know whether gender discrimination is occurring so that it can be brought out into the open and addressed. Yet, further research suggesting that hiring women patent agents and patent lawyers disadvantages patent applicants could damage the professional prospects of individual female Patent Bar members. This is the sort of double bind that typically haunts empirical research concerning gender. Reducing discrimination against female inventors, patent agents, and patent lawyers requires information about the size and nature of the problem, but publicizing the size and nature of the problem can actually make it worse by validating concerns that the performance of women in the patent realm is likely to be inferior, even though it is due to sexism rather than to individual attributes.

⁴⁹ Austin Underhill, *New Findings: Male Inventors Have a Greater Chance of Success at the USPTO; Female Examiners Are Faster*, JURISTAT (May 11, 2015), <https://www.juristat.com/blog/new-findings-male-inventors-have-a-greater-chance-of-success-at-the-uspto-female-examiners-are-faster> (“Nonetheless, it’s important to remember that 15.9% of examiners could not be classified. Moreover, male examiners approved 66.2% of applications filed by inventors with gender-neutral names. Female examiners approved 63.5% of such applications.”).

⁵⁰ Scott Jaschik, *The Gender Factor in Conference Presentations*, INSIDE HIGHER ED (Sept. 7, 2016), <https://www.insidehighered.com/news/2016/09/07/new-study-suggests-continued-bias-academic-conference-panel-selections>.

⁵¹ Seán G. Roberts & Tessa Verhoef, *Double-Blind Reviewing at EvoLang 11 Reveals Gender Bias*, 1 J. LANGUAGE EVOLUTION 163, 165 (2016).

⁵² See generally Saurabh Vishnubhakat, *Gender Diversity in the Patent Bar*, 14 J. MARSHALL REV. INTEL. PROP. L. 67 (2014).

Top quality innovative research can occur without patenting activity. But while there are plenty of reasons to question the social value of extensive patenting of useful inventions,⁵³ being listed as an inventor on a patent is viewed in many quarters as a positive metric of professional accomplishment.⁵⁴ USPTO Director Michelle Lee has observed:

As we consider the gender disparity in patenting, please understand that patents are often crucial in creating and funding a business. As anyone who has watched the TV show *Shark Tank* knows, investors often want to know if you have a patent before they provide you with funding. So who has patents has implications on who can get funding for starting a new business. And in this respect, some research also reveals a trend that even when women are named as inventors on patents, they commercialize their patents at a much lower rate. And let's not forget that being named as an inventor on a patent often represents a milestone in a person's own life story.

Having a patent is validation of hard work and creativity and is a significant professional accomplishment. People are rightfully proud of being named as inventors on patents, and they can lead to enhanced professional opportunities in their fields. So the significant gender disparity in who is receiving patents has real implications.⁵⁵

The gender disparity in patenting also supports a sexist narrative that women are inferior to, and less inventive than, men.⁵⁶ This is a corrosive chronicle of long standing, as has been brilliantly described by Kara Swanson.⁵⁷ In fact, the cause of

⁵³ See generally Mark A. Lemley, *Faith-Based Intellectual Property*, 62 UCLA L. REV. 1328, 1339–43 (2015); Lisa Larrimore Ouellette, *Cultural Cognition of Patents*, 4 IP THEORY 28, 29–31 (2014).

⁵⁴ See, e.g., Ann Bartow, *Separating Marketing Innovation from Actual Invention: A Proposal for a New, Improved, Lighter, and Better-Tasting Form of Patent Protection*, 4 J. SMALL & EMERGING BUS. L. 1, 3 (2000); Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 652–53 (2002).

⁵⁵ Remarks by Director Michelle K. Lee at the “Invention: Does Gender Matter?” Roundtable, USPTO (Nov. 10, 2015, 10:00 AM), <http://www.uspto.gov/about-us/news-updates/remarks-director-michelle-k-lee-invention-does-gender-matter-roundtable>.

⁵⁶ See, e.g., Joanna Klein, *Metaphorically Speaking, Men Are Expected To Be Struck by Genius, Women To Nurture It*, N.Y. TIMES (Oct. 11, 2016), <http://www.nytimes.com/2016/10/12/science/women-stem-metaphors.html>.

⁵⁷ See generally Kara W. Swanson, *Getting a Grip on the Corset: Gender, Sexuality, and Patent Law*, 23 YALE J.L. & FEMINISM 57 (2011) (analyzing intellectual property from a feminist perspective, starting with the Supreme Court case *Egbert v. Lippmann*).

underpatenting by women is most likely bias in the workplace. One study of patenting in the life sciences found that while female scientists may produce less commercial work than their male colleagues, “[t]he quality and impact of women’s commercial work remains the same or better than that of men scientists.”⁵⁸ The study “results imply that a necessary focus for future work is to understand the personal, structural, and organization reasons for the filtering process which leads to such a small proportion of female inventors.”⁵⁹

All of these factors may cause women to doubt their own abilities, which can lead to underperformance. This is called “stereotype threat,” and it happens when women internalize negative gender stereotypes.⁶⁰ A persuasive example is found in research that sought to determine why so few women become elite chess players. The study found:

When players were unaware of the sex of opponent (control condition), females played approximately as well as males. When the gender stereotype was activated (experimental condition), women showed a drastic performance drop, but only when they were aware that they were playing against a male opponent. When they (falsely) believed to be playing against a woman, they performed as well as their male opponents. In addition, our findings suggest that women show lower chess-specific self-esteem and a weaker promotion focus, which are predictive of poorer chess performance.⁶¹

In sum, the gender disparity in patenting is caused by factors that include: (1) discrimination that leads to fewer women studying STEM subjects other than biology in academia, from middle school through graduate school; (2) discrimination that makes jobs in STEM fields unavailable to women scientists and engineers or renders them unappealing to remain in, leading to low levels of retention or advancement of women;

⁵⁸ Kjersten Bunker Whittington & Laurel Smith-Doerr, *Gender and Commercial Science: Women’s Patenting in the Life Sciences*, 30 J. TECH. TRANSFER 355, 355 (2005).

⁵⁹ *Id.*

⁶⁰ *Stereotype Threat Widens Achievement Gap*, AM. PSYCHOLOGICAL ASS’N (July 15, 2006), <http://www.apa.org/research/action/stereotype.aspx>.

⁶¹ Anne Maass et al., *Checkmate? The Role of Gender Stereotypes in the Ultimate Intellectual Sport*, 38 EUR. J. SOC. PSYCHOL. 231, 231 (2008), http://onlinelibrary.wiley.com/store/10.1002/ejsp.440/asset/440_ft.pdf?jsessionid=6EDC71A48376F4D76818C2F2E0901557.f04t04?v=1&t=iwwe4nvu&s=09651c62b25013f7f82baddf16b994bfae67a2b0.

(3) discrimination against women inventors, women patent agents, and women patent lawyers; and (4) the negative effects that stereotype threat can have upon job performance for women in STEM occupations. Sexual harassment is one of several additional impediments not discussed here but is deeply problematic.⁶²

The situation on the copyright side of the intellectual property equation is very different. In most of the copyright intensive industries, women flood the pipelines. But they are unable to float to the tops of their professions at the same rates as men.

III. COPYRIGHTS: WOMEN ARE OVERREPRESENTED IN MOST CREATIVE PROFESSIONS BUT EXPERIENCE SIGNIFICANTLY LESS COMMERCIAL SUCCESS

Authorship in copyright is a complicated construct.⁶³ Anyone who creates a copyrightable work is, within the copyright realm, denoted an author, even though in common parlance they would be described as painters, sculptors, composers, singers, musicians, playwrights, filmmakers, choreographers, architects, poets, novelists, journalists, or mimes, depending upon what sorts of works they produce. Moreover, as Carys Craig has explained:

The theoretical framework of intellectual property law, and copyright law in particular, is premised upon liberal and neo-liberal assumptions. At the core of copyright's functionality are the concepts of private rights, property, ownership, exclusion, and individualism. At the core of copyright's justifications are the concepts of individual entitlement or desert, on one hand, and economic rationality and self-interest on the other. Within this model, authors are individuated, proprietary personalities with a claim to ownership of their intellectual works; these works are the original, stable, and propertizable results of the authors' independent efforts. Far from a situated, communicative act, the authorial activity presupposed by

⁶² Claudia Dreifus, *C. Megan Urry, Peering into Universe, Spots Bias on the Ground*, N.Y. TIMES (Nov. 28, 2016), <http://www.nytimes.com/2016/11/28/science/c-megan-urry-peering-into-universe-spots-bias-on-the-ground.html>.

⁶³ Carys J. Craig, *Reconstructing the Author-Self: Some Feminist Lessons for Copyright Law*, 15 AM. U. J. GENDER SOC. POL'Y & L. 207, 208 (2007).

intellectual property is an individual act that produces a commodifiable thing and, of course, a right against all others in relation to that thing.⁶⁴

Commercially valuable copyrightable works follow the same pattern of valuable patents.⁶⁵ Something keeps them disproportionately in the hands of men, even though the “small pool” problem of most STEM fields is absent. In fact, significantly more women than men enter and work in the creative fields for which copyright law is designed and assertively deployed—excepting computer software and spectator sports.⁶⁶ A series of factors other than low pipeline numbers causes gender disparity at the top of the commercial creative industries.

These factors include gender discrimination. When creative efforts are associated with women, it devalues them. In consequence, women performers may be perceived as less talented than men who are, on a strictly merit basis, their equals. Implicit sexism prevents people from judging performers from a gender-neutral baseline. To illustrate: Female musicians who audition behind a screen so that their gender is unknown are more likely to succeed.⁶⁷ When all musicians audition behind screens, female musicians succeed at approximately the same rate as male musicians.⁶⁸ Even in a competition in which a screen was only used for preliminary auditions, this alone made it 50% more likely that a woman advanced to the finals.⁶⁹ This is despite the fact that “even a screen doesn’t always yield a gender blind event. Screens keep juries from seeing the candidates move into position, but the telltale sounds of a woman’s shoes allegedly

⁶⁴ *Id.*

⁶⁵ *Id.* at 227.

⁶⁶ John Mindiola, *Gender Disparities in the Design Field*, SMASHING MAG. (Nov. 12, 2010), <https://www.smashingmagazine.com/2010/11/gender-disparities-in-the-design-field>; see also Ann Bartow, *Fair Use and the Fairer Sex: Gender, Feminism, and Copyright Law*, 14 AM. U. J. GENDER SOC. POL’Y & L. 551, 551–52 (2006).

⁶⁷ Claudia Goldin & Cecilia Rouse, *Orchestrating Impartiality: The Impact of “Blind” Auditions on Female Musicians*, 90 AM. ECON. REV. 715, 716 (2000), <https://www.aeaweb.org/articles?id=10.1257/aer.90.4.715>; Curt Rice, *How Blind Auditions Help Orchestras To Eliminate Gender Bias*, THE GUARDIAN (Oct. 14, 2013, 7:00 AM), <https://www.theguardian.com/women-in-leadership/2013/oct/14/blind-auditions-orchestras-gender-bias>.

⁶⁸ Rice, *supra* note 67.

⁶⁹ *Id.*

influenced some jury members such that aspiring musicians were instructed to remove their footwear before coming onto the stage.⁷⁰

There is rarely a proxy for the audition screen to obfuscate gender when other qualitative choices are being made, particularly in the performing arts, where bodies and voices often signal gender. To a certain extent, an audition screen facsimile can be available to visual artists and the authors of textual works, who can hide feminine first names by using only initials. Joanne Rowling published her *Harry Potter* series as J.K. Rowling so that her female authorship would not put off potential readers.⁷¹ When her books got famous, so did she, and it is not clear she lost any *Harry Potter*-related sales when people realized she was a woman. But when she published her first murder mystery novel written for adults, it was as Robert Galbraith.⁷² Odds are that if an attorney who breached the duty of confidentiality had not exposed this ruse, Ms. Rowling would still be using her masculine pen name.

In addition, as writer Sady Doyle has so movingly observed, Rowling chose to make Harry Potter the primary protagonist of her first seven books because, while girls would read books about a boy, boys might be far less likely to buy into a series with a female at its center.⁷³ Doyle satirically wrote:

Hermione is not Chosen. That's the best thing about her. Hermione is a hero because she decides to be a hero; she's brave, she's principled, she works hard, and she never apologizes for the fact that her goal is to be very, extremely good at this whole "wizard" deal. Just as Hermione's origins are nothing special, we're left with the impression that her much-vaunted intelligence might not be anything special, on its own. But Hermione is never comfortable with relying on her "gifts" to get by. There's no prophecy assuring her importance; the only way for Hermione to have the life she wants is to work for it. So

⁷⁰ *Id.*

⁷¹ Richard Savill, *Harry Potter and the Mystery of J K's Lost Initial*, THE TELEGRAPH (July 19, 2000, 12:00 AM), <http://www.telegraph.co.uk/news/uknews/1349288/Harry-Potter-and-the-mystery-of-J-Ks-lost-initial.html>.

⁷² Liz Bury, *JK Rowling Tells Story of Alter Ego Robert Galbraith*, THE GUARDIAN (July 24, 2013, 5:52 AM), <https://www.theguardian.com/books/2013/jul/24/jk-rowling-robert-galbraith-harry-potter>.

⁷³ Sady Doyle, *In Praise of Joanne Rowling's Hermione Granger Series*, GLOBAL COMMENT (July 20, 2011), <http://globalcomment.com/in-praise-of-hermione-granger-series>.

Hermione Granger, generation-defining role model, works her adorable British ass off for seven straight books in a row. Although she deals with the slings and arrows of any coming-of-age tale—being told that she’s “bossy,” stuck-up, boring, “annoying,” etc—she’s too strong to let that stop her. In *Hermione Granger and the Prisoner of Azkaban*, she actually masters the forces of space and time just so that she can have more hours in the day to learn.

And it pays off. Hermione saves the day, over and over; in every book, there is a moment where her classmates need to be saved, and they need a plan that is going to save them, and they inevitably turn to Hermione, “the brightest witch of her age.” Hermione always comes through; she has the plans, she saves them all. That’s why her name is on the cover of every book.⁷⁴

Of course, it is Harry Potter’s name that is on the cover of every book. He is the clear star of that seven volume literary juggernaut. Hermione Granger simply gets supporting cast billing, because of the fear by Rowling or her publisher that no one would want to read a series of books with too many girl germs.

Though women visual artists can attempt to obfuscate their genders as Rowling managed to do temporarily, there is no evidence that doing so has been a path to fame or financial rewards thus far. The number of successful female artists is tiny.⁷⁵ *ARTnews* ran an infographic in November of 2015 that compared the gender disparity in authorship of postwar and contemporary art works for sale at the New York evening auctions, and showed that 92% of lots were by male artists, while only 8% were by women.⁷⁶ This “was the same percentage of women artists represented at MoMA in 2012 by Jerry Saltz’s count in his piece ‘Where are all the women?’ for *New York* magazine.”⁷⁷

⁷⁴ *Id.*

⁷⁵ Ben Davis, *Why Are There Still so Few Successful Female Artists?*, ARTNET: NEWS (June 23, 2015), <https://news.artnet.com/market/female-artists-pay-gap-307951>.

⁷⁶ *Are the November Postwar and Contemporary Auctions a Boys’ Club? A Look at the Numbers*, ARTNEWS (Oct. 24, 2015, 11:00 AM), <http://www.artnews.com/2015/10/24/november-postwar-contemporary-auctions-boys-club>.

⁷⁷ Hannah Ghorashi, *Inequality Endures: The Price of Being a Female Artist in 2015*, ARTNEWS (Dec. 30, 2015, 10:25 AM) (citation omitted), <http://www.artnews.com/2015/12/30/women-art-status-in-2015>.

It is difficult to ascertain clear gender patterns across the many dimensions of music. Gender stereotypes affect which instruments children choose to play.⁷⁸ Significantly more female students participate in high school choruses, bands, and orchestras.⁷⁹ But more male students than female students participate in jazz programs.⁸⁰

Many more women now play in professional orchestras in the United States than in the past,⁸¹ and women usually account for at least a third of a top orchestra's members.⁸² Yet, vastly fewer women conduct orchestras than men.⁸³ And a survey of the twenty-two largest orchestras in the United States found that women had composed only 1.8% "of the total pieces performed in the 2014–2015 concert season."⁸⁴

⁷⁸ Steven N. Kelly & Kimberly VanWeelden, *Gender Associations with World Music Instruments by Secondary School Music Students from the USA*, 32 INT'L J. MUSIC EDUC. 478, 479 (2014); Elizabeth R. Wrape et al., *Gender and Musical Instrument Stereotypes in Middle School Children: Have Trends Changed?*, 34 UPDATE: APPLICATIONS RES. MUSIC EDUC. 40, 40 (2016) (finding that "gender stereotypes remain entrenched and pose a persisting problem facing music educators").

⁷⁹ Kenneth Elpus, *National Estimates of Male and Female Enrolment in American High School Choirs, Bands and Orchestras*, 17 MUSIC EDUC. RES. 88, 96, 98 (2015), <http://www.tandfonline.com/doi/abs/10.1080/14613808.2014.972923>; Tom Jacobs, *High School Music Groups Grapple with Gender Gap*, PAC. STANDARD MAG. (Nov. 19, 2014), <https://psmag.com/high-school-music-groups-grapple-with-gender-gap-db8098ad41d8#.9e5hpgqgq>.

⁸⁰ Erin Wehr-Flowers, *Differences Between Male and Female Students' Confidence, Anxiety, and Attitude Toward Learning Jazz Improvisation*, 54 J. RES. MUSIC EDUC. 337, 337 (2006).

⁸¹ Sarah Bryan Miller, *In Orchestras, a Sea Change in Gender Proportions*, ST. LOUIS POST-DISPATCH (Mar. 30, 2014), http://www.stltoday.com/entertainment/arts-and-theatre/in-orchestras-a-sea-change-in-gender-proportions/article_25cd8c54-5ca4-529f-bb98-8c5b08c64434.html.

⁸² Suby Raman, *Graphing Gender in America's Top Orchestras*, TUMBLR (Nov. 18, 2014, 11:34 AM), <http://subyraman.tumblr.com/post/102965074088/graphing-gender-in-americas-top-orchestras>.

⁸³ Hannah Levintova, *Here's Why You Seldom See Women Leading a Symphony*, MOTHER JONES (Sept. 23, 2013, 6:00 AM), <http://www.motherjones.com/media/2013/09/women-conductors-gap-charts-marin-alsop-proms>.

⁸⁴ Ricky O'Bannon, *By the Numbers: Female Composers*, BALT. SYMPHONY ORCHESTRA, <http://www.bsomusic.org/stories/by-the-numbers-female-composers.aspx> (last visited Jan. 14, 2017).

And there is gender bias in opera. Prior to the Metropolitan Opera's premiere of Kaija Saariaho's "L'Amour de Loin" on December 1, 2016, the Met had not performed an opera written by a woman since Ethel Smyth's "Der Wald" in 1903.⁸⁵ That is a 113-year interval of all male opera composers.

There are also gendered preferences across mainstream popular musical audiences.⁸⁶ Overall, women recording artists are listened to less often than men and correspondingly earn less.⁸⁷ Commercial radio stations were long the mechanism by which musical tastes were shaped, and heavy airplay turned sound recordings into hits and the artists who performed them into famous names. Men have always dominated every aspect of this industry.⁸⁸ At one time the dearth of women working at commercial radio stations could have been partially explained by the lower proportion of women in the workforce generally, but those days passed many decades ago. Songs performed by women were and continue to be played less on commercial radio broadcasts across every genre of music, with the possible

⁸⁵ Zachary Woolfe, *Your Guide to a Met Opera Milestone*, N.Y. TIMES (Nov. 25, 2016), <http://www.nytimes.com/2016/11/25/arts/music/your-guide-to-a-met-opera-milestone-kaija-saariaho-lamour-de-loin.html>.

⁸⁶ Paul Lamere, *Gender Specific Listening*, MUSIC MACHINERY (Feb. 10, 2014, 4:09 PM), <https://musicmachinery.com/2014/02/10/gender-specific-listening>.

⁸⁷ Tom Jacobs, *Pop Charts Still Dominated by Men*, PAC. STANDARD MAG. (Dec. 14, 2011), <https://psmag.com/pop-charts-still-dominated-by-men-edf11208a9c2#.a2c1hggnz>; Daniel Bukszan, *In 2015, Most of the Highest Paid Musicians Are Men*, FORTUNE (Nov. 12, 2015, 5:50 AM), <http://fortune.com/2015/11/12/highest-paid-musicians-pop>; see also Jim Farber, *Female Pop Artists May Get the Magazine Covers and Headlines, but Men Get the Sales*, N.Y. DAILY NEWS (Jan. 26, 2014, 2:00 AM), <http://www.nydailynews.com/women-pop-artists-headlines-men-sales-article-1.1571333>; Helienne Lindvall, *Behind the Music: The Gender Gap Shows No Sign of Closing*, THE GUARDIAN (May 7, 2010, 7:55 AM), <https://www.theguardian.com/music/musicblog/2010/may/07/behind-the-music-gender-gap>; Ange McCormack, *By the Numbers: Women in the Music Industry*, AUSTRALIAN BROAD. CORP., <http://www.abc.net.au/triplej/programs/hack/girls-to-the-front/7223798> (last updated Mar. 14, 2016, 3:11 PM); see generally Karen A. Saucier, *Images of Women and Men in Country Music*, in ALL THAT GLITTERS: COUNTRY MUSIC IN AMERICA 241–58 (George H. Lewis ed., 1993).

⁸⁸ Martin Hadlow, *Radio and Gender Equality*, UNESCO (Feb. 13, 2014), <http://www.unesco.org/new/en/unesco/events/prizes-and-celebrations/celebrations/international-days/world-radio-day-2014/articles/martin-hadlow-radio-and-gender-equality>; see also Jessica Brassington, *Women in the Music Industry: A Call for Equal Profiling and Stronger Representation*, IMPAKTER (June 25, 2015, 10:01 AM), <http://impakter.com/women-music-industry-call-equal-profiling-stronger-representation>.

exception of “Women’s Music,” which has been largely integrated into other genres and is not played as often now as a decade ago.⁸⁹

Now that people are introduced to new music via a variety of Internet-based sources, including but not even remotely limited to Pandora and Spotify, it is possible that women artists will be promoted in more proportionate numbers. There is no evidence that this is occurring at present, however. Internet-based music distribution offers the promise of more efficient and accurate data collection, so the ways in which women artists are disadvantaged can be more accurately mapped and quantified.⁹⁰

One gendered issue related to the success of copyrighted sound recordings is the physical attractiveness of the musical artists who perform them. While male singers doubtlessly benefit from physical attractiveness, it is very rare for women to succeed in the music industry without it. There are plenty of examples of older men, overweight men, and men with unusual facial constructions being successful as musical performers. But the few women who do not embody the elevated and difficult-to-attain beauty standards of the entertainment industries often pay a significant price through media censure and public criticism. “And no one’s getting fat except Mama Cass” is a line from a Mamas and the Papas song; “Mama” Cass Elliot always felt that her weight “set[] [her] apart.”⁹¹ Carnie Wilson has been continually badgered by the media about her weight since her time performing with Wilson Phillips.⁹² While Adele is a

⁸⁹ Margie Adam, *Thoughts on Women’s Music*, MARGIEADAM.COM, <http://www.margieadam.com/info/thoughts.htm> (last visited Jan. 14, 2017).

⁹⁰ See, e.g., Alex Pham, *Exclusive: Pandora’s Plan To Share More Streaming Data with Artists*, BILLBOARD BIZ (May 14, 2013, 7:59 PM), <http://www.billboard.com/biz/articles/news/1561471/exclusive-pandoras-plan-to-share-more-streaming-data-with-artists>.

⁹¹ Andrew G. Marshall, *No One’s Getting Fat Except Mama Cass*, THE GUARDIAN (July 25, 1999, 10:41 PM), <https://www.theguardian.com/world/1999/jul/26/gender.uk1> (“But though outwardly confident, Cass felt the pressure to be slim. ‘She said she’d never go on stage because Michelle [the other Mama] was beautiful and she wasn’t,’ says John Phillips, one of the Papas. She was persuaded to change her mind but no one stopped her trying dangerous diets. In 1968, after seven months of fasting four days a week, Cass had shed 110lbs but ended up in hospital. She never really recovered.”).

⁹² *Hold On . . . To Your Greens*, DAILYMAIL.COM (June 24, 2013, 12:15 AM), <http://www.dailymail.co.uk/tvshowbiz/article-2347125/Yo-yo-dieter-Carnie-Wilson-daughters-stock-healthy-food-Farmers-Market.html> (“After reaching a weight as dangerously high as 300 pounds, Carnie had gastric bypass surgery in 1999, which

certifiable pop music superstar at the moment, her appearance is also mocked and criticized.⁹³ Meghan Trainor gained fame with a rebellious song about body size, “All About That Bass,” but received a tidal wave of pushback, replete with accusations that she was harmfully glorifying unhealthy behaviors among her fans.⁹⁴ Singer and American Idol winner Kelly Clarkson is continually asked to “respond” to negative comments made about her body.⁹⁵ Examples of similar sorts of body shaming of male recording artists are comparatively rare; not a single example comes to the mind of this author, though further research might uncover some.

To switch to another pop culture industry, consider gender disparities on television. Proportionately few television programs have casts dominated by women; far more successful shows—including *Modern Family*, *The Big Bang Theory*, *Breaking Bad*, *Better Call Saul*, *The Walking Dead*, *Grey’s Anatomy*, *Supernatural*, *NCIS*, *Criminal Minds*, and *Castle*—fall prey to the pattern of *Seinfeld*, and have more male primary

was broadcast live on the Internet and most likely saved her life. She quickly went from a size 28 to a size 6, lost 150 pounds and subsequently posed for *Playboy Magazine* in 2003. However, she has gained some weight back over the past decade, despite appearances on shows like VH1’s *Celebrity Fit Club*, where she was documented losing 22 pounds. In 2012, *Carnie* revealed she had lap-band surgery to further help her deal with her chronic weight gain.”).

⁹³ See Emma Brankin, *Secret to Adele’s Dramatic Weight Loss*, NEWS.COM.AU (Feb. 15, 2016, 6:03 PM), <http://www.news.com.au/lifestyle/fitness/secret-to-adeles-dramatic-weight-loss/news-story/1c686c4ce936c00a8010f9650391aae4>; Anna Francis, *What a Transformation! See Adele’s Weight Loss Story in Pictures*, CELEBSNOW (Aug. 18, 2016, 12:15 PM), <http://www.celebsnow.co.uk/so-hot-right-now/what-a-transformation-see-adeles-weight-loss-story-in-pictures-31550>.

⁹⁴ See, e.g., Kate Beaudoin, *There’s a Big Problem with Meghan Trainor’s Music That Nobody’s Talking About*, MUSIC.MIC (May 13, 2015), <https://mic.com/articles/118136/meghan-trainor-threatens-to-undo-everything-feminist-pop-stars-have-accomplished#.Ea2rMQMOE>; Why I Will Never Respect Meghan Trainor, AMBITIOUSLY LIVING (Apr. 24, 2015), <https://ambitiouslyliving.wordpress.com/2015/04/24/why-i-will-never-respect-meghan-trainor/comment-page-3>.

⁹⁵ See, e.g., Ree Hines, *Kelly Clarkson Responds to Body-Shaming Hubbub: ‘Are You Serious?’*, TODAY (Apr. 3, 2015, 11:56 AM), <http://www.today.com/health/kelly-clarkson-body-shaming-hubbub-are-you-serious-t12901>; Zach Johnson, *Kelly Clarkson Addresses Body Shaming Controversy*, E NEWS (Apr. 3, 2015, 9:30 AM), <http://www.eonline.com/news/642668/kelly-clarkson-addresses-body-shaming-controversy>; Ezra Marcus, *A Fox News Host Is Under Fire for Making Body-Shaming Comments About Kelly Clarkson*, MTV NEWS (Apr. 4, 2015), <http://www.mtv.com/news/2124114/chris-wallace-kelly-clarkson-body-shaming>.

protagonists than female ones.⁹⁶ Nighttime television talk shows are almost all hosted by men.⁹⁷ So are game shows.⁹⁸ And network news shows.⁹⁹ There is even some evidence that competitive cooking shows feature more male than female judges and competitors.¹⁰⁰

⁹⁶ See DARNELL HUNT & ANA-CHRISTINA RAMÓN, RALPH J. BUNCHE CTR. FOR AFRICAN AM. STUDIES AT UCLA, 2015 HOLLYWOOD DIVERSITY REPORT: FLIPPING THE SCRIPT 14–15 (2015), <http://www.bunchecenter.ucla.edu/wp-content/uploads/2015/02/2015-Hollywood-Diversity-Report-2-25-15.pdf>.

⁹⁷ Gary Susman, *Why Are There No Women Late-Night Talk Show Hosts?*, MOVIEFONE (Dec. 5, 2014), <https://www.moviefone.com/2014/12/05/women-late-night-talk-show-hosts>; see also Caroline Framke, *Samantha Bee Is the Only Woman with a Late-Night Show. Here's How She Plans To Make It Count.*, VOX (Feb. 8, 2016), <http://www.vox.com/2016/2/8/10937782/samantha-bee-full-frontal-review>; David Sims, *Samantha Bee Disrupts the Late-Night TV Boys Club*, THE ATLANTIC (Sept. 2, 2015), <http://www.theatlantic.com/entertainment/archive/2015/09/samantha-bee-full-frontal-tbs/403471>.

⁹⁸ *Are TV Game Shows Sexist?*, ABOUT-FACE (Sept. 7, 2010), <http://www.about-face.org/are-tv-game-shows-sexist>; Chris Suellentrop, *Classic Concentration*, SLATE: CULTUREBOX (Apr. 5, 2001, 11:30 PM), http://www.slate.com/articles/arts/culturebox/2001/04/classic_concentration.html; see also Tambay A. Obenson, *Michael Strahan Joins the Game Show Host Circuit, Which Is Apparently Becoming a Black Man's Domain*, INDIEWIRE (Jan. 8, 2016, 8:37 PM), <http://www.indiewire.com/2016/01/michael-strahan-joins-the-game-show-host-circuit-which-is-apparently-becoming-a-black-mans-domain-162186>.

⁹⁹ WOMEN'S MEDIA CTR., THE STATUS OF WOMEN IN THE U.S. MEDIA 2015 9–10 (2015), https://wmc.3cdn.net/7d039991d7252a5831_0hum68k6z.pdf; *Study Shows Women Analysts Missing from Primetime Convention Cable News Coverage*, WOMEN'S MEDIA CTR. (Oct. 20, 2016), <http://www.womensmediacenter.com/press/entry/Study-Shows-Women-Analysts-Missing-From-Primetime-Convention-Cable-News-Cov>; Catherine Taibi, *The Media Is Failing Women, but One Network Is Leading the Fight To Change Things*, HUFFINGTON POST (June 18, 2015, 11:04 AM), http://www.huffingtonpost.com/2015/06/18/pbs-women-media-newshour_n_7587852.html.

¹⁰⁰ Kendra Weddle Irons, *The Food Network: A Challenge to Gender Equality?*, CHRISTIAN FEMINISM TODAY, <https://eewc.com/FemFaith/food-network-challenge-gender-equality> (last visited Dec. 20, 2016); see also Rebecca Swenson, *Cooking Class: Gender on the Food Network*, COMMUNICATION CURRENTS (Apr. 2009), <https://www.natcom.org/CommCurrentsArticle.aspx?id=914> (noting how male Food Network stars “establish their relationship to food as a professional one” while female stars are portrayed as “approachable, domestic cooks”).

A majority of the stars of widely released movies are men,¹⁰¹ even though the exclusion of women can be costly.¹⁰² Even when women actors get hired, they are often paid less than men, as this anecdote illustrates:

While there's plenty of valid criticism for how the gender pay gap isn't going to be closed by rich white actresses, an anecdote Hilary Swank tells about how she was paid earlier in her career is still fairly shocking. She explains that she only made \$3,000 for her Academy Award-winning performance in *Boys Don't Cry*, which didn't even qualify her for health insurance. After her second Oscar win, she was offered a part across from a male lead who had recently become "hot," but had no critical acclaim. He was paid \$10 million and she was offered \$500,000. After she turned down the role, the part was given to an upcoming actress who was paid only \$50,000.¹⁰³

Most playwrights whose work is produced in large and culturally important theaters are men.¹⁰⁴ Most television programs, mainstream big studio movies, and national plays are likely to be largely written by men, produced and directed by men, scored by men, and feature male actors, despite the fact that women study dramatic writing, production, screenplay writing, direction, scenery painting, set design, music, improvisation, and acting in much higher numbers than men.¹⁰⁵

¹⁰¹ Brent Lang, *Study Finds Fewer Lead Roles for Women in Hollywood*, VARIETY (Feb. 9, 2015, 6:31 PM), <http://variety.com/2015/film/news/women-lead-roles-in-movies-study-hunger-games-gone-girl-1201429016>; Dorothy Pomerantz, *Women Still Ridiculously Underrepresented in Movies*, FORBES (Aug. 5, 2015, 1:59 PM), <http://www.forbes.com/sites/dorothypomerantz/2015/08/05/women-still-ridiculously-underrepresented-in-movies/#2d67a0055427>.

¹⁰² Walt Hickey, *The Dollar-and-Cents Case Against Hollywood's Exclusion of Women*, FIVETHIRTYEIGHT (Apr. 1, 2014, 1:52 PM), <https://fivethirtyeight.com/features/the-dollar-and-cents-case-against-hollywoods-exclusion-of-women> (finding "that films that pass the Bechdel test [for female characters exhibiting at least minimal depth] tend to do better dollar for dollar than those that don't—even internationally").

¹⁰³ Aimée Lutkin, *Hilary Swank Was Once Offered \$500,000 To Play Opposite a Man Who Made \$10 Million*, JEZEBEL (Oct. 19, 2016, 4:30 PM), <http://jezebel.com/hilary-swank-was-once-offered-500-000-to-play-opposite-1787976789>.

¹⁰⁴ See Patricia Cohen, *Rethinking Gender Bias in Theater*, N.Y. TIMES (June 24, 2009), <http://www.nytimes.com/2009/06/24/theater/24play.html>. Cf. Michele Willens, *The Sexist Reality That the Tony Nominations Just Highlighted*, THE ATLANTIC (Apr. 29, 2014), <http://www.theatlantic.com/entertainment/archive/2014/04/broad-ways-shockingly-resilient-glass-curtain/361340>.

¹⁰⁵ See, e.g., Manohla Dargis, *It's a Men's, Men's, Men's World*, N.Y. TIMES, Dec. 28, 2014, at AR1; Suzy Evans, *Women Push for Equality on and off Stage*, AM. THEATRE (Sept. 17, 2014), <http://www.americantheatre.org/2014/09/17/women-push>.

The few areas that women dominate on a typical set or backstage—costume and wardrobe departments, hair styling and make-up application, and casting—are comparatively low status.¹⁰⁶ The announcement that women would direct every episode of the second season of the television series *Jessica Jones* was a media sensation because, as one observer noted:

Women made up about one-third of directors for *Jessica Jones*' first season. That might not sound like a lot, but that's almost twice the average. [In 2015], less than 18% of television episodes had female directors—with *Jessica Jones* being one of the more female-represented shows. Men (especially white men) still make up an overwhelming percentage of television show directors, with shows like *Fargo*, *It's Always Sunny in Philadelphia*, and *Stranger Things* not having any women or people of color behind the camera. And it's not getting much better. For example, the next season of *Game of Thrones* doesn't have any female directors, despite its focus on female rulers.¹⁰⁷

The *New York Times* recently published an article entitled, *Breaking the Glass Slipper: Where Are the Female Choreographers?*, and subtitled: "It has become a rarity for ballet companies to present works by women, despite the large number of women in the field and the pioneers of the 20th century."¹⁰⁸ In it, the author observed:

New York City Ballet performed 58 ballets this season, including seven world premieres—and not one was by a woman. London's Royal Ballet also did no ballets by women this season on its main stage at Covent Garden and has yet to commission a new work by a woman for the main stage this century. In Moscow, the Bolshoi danced more than two dozen ballets this season, but only one was by a woman, and only partially: "Short

for-equality-on-and-off-stage; *Diversity Sells—But Hollywood Remains Overwhelmingly White, Male*, NPR (Feb. 28, 2015, 5:45 PM), <http://www.npr.org/sections/codeswitch/2015/02/28/389259335/diversity-sells-but-hollywood-remains-overwhelmingly-white-male>; Willens, *supra* note 104.

¹⁰⁶ Hannah Ellis-Petersen, *Gender Bias in the Film Industry: 75% of Blockbuster Crews Are Male*, THE GUARDIAN (July 22, 2014, 2:45 PM), <https://www.theguardian.com/film/2014/jul/22/gender-bias-film-industry-75-percent-male>.

¹⁰⁷ Beth Elderkin, *Women Will Direct Every Episode of Jessica Jones Season 2*, GIZMODO (Oct. 22, 2016, 10:15 AM), <http://io9.gizmodo.com/women-will-direct-every-episode-of-jessica-jones-season-1788101861>.

¹⁰⁸ Michael Cooper, *Breaking the Glass Slipper*, N.Y. TIMES (June 26, 2016), <http://www.nytimes.com/2016/06/26/arts/dance/breaking-the-glass-slipper-where-are-the-female-choreographers.html>.

Time Together,” by the team of Paul Lightfoot and Sol León. And American Ballet Theater presented just one ballet by a woman this season in New York, “The Brahms-Haydn Variations” by Twyla Tharp.¹⁰⁹

This is in spite of the fact that “[a]t ballet schools, girls typically outnumber boys, who are sometimes coaxed to attend with reduced or even free tuition,”¹¹⁰ and women do most of the teaching.¹¹¹

In a far less rarified entertainment industry, pornography, women performers are paid more than men.¹¹² But artistic control is held overwhelmingly by men, as are the copyrights, and it is to men that the serious profits from pornography flow.¹¹³

The overall gender gap pervading control over lucrative copyrights is difficult to measure. Empirical research on copyright registrations has been conducted by Robert Brauneis and Dotan Oliar.¹¹⁴ In their thirty-five-year research window between 1978 and 2012, Brauneis and Oliar found that two-thirds of all authors represented in copyright registrations were male.¹¹⁵ The percentage of women registering textual literary works increased during this period, but “[w]omen’s share of registered musical and dramatic works . . . remained basically unchanged and in the minority, and women’s share of registered visual art has actually decreased.”¹¹⁶ The study further found:

[A] great variation in trends across the different work types. First, males and females differ in their patterns of authorship: some fields are more male-dominated than others. The work types sorted from the least to most male-dominated are art (54.34% male), text (57.45%), drama (69.99%), music (75.98%), movies (78.16%) and software (88.22%).¹¹⁷

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² Courtney Ryan, *Is There a Wage Gap in the Porn Industry?*, REFINERY29 (July 19, 2016, 12:20 PM), <http://www.refinery29.com/porn-industry-gender-pay-gap>.

¹¹³ Ann Bartow, *Copyright Law and Pornography*, 91 OR. L. REV. 1, 3–4 (2012).

¹¹⁴ Robert Brauneis & Dotan Oliar, *Copyright’s Race, Gender and Age: A First Quantitative Look at Registrations* (George Washington Law Sch. Pub. Law & Legal Theory Paper No. 2016-48), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2831850.

¹¹⁵ *Id.* at 3.

¹¹⁶ *Id.*

¹¹⁷ *Id.* at 23.

IV. PROFESSIONAL SPORTS, LUCRATIVELY EXPLOITED AS COPYRIGHTABLE AUDIO VISUAL WORKS, ARE OVERWHELMINGLY DOMINATED BY MEN

Professional sports requires special attention because sports are not always recognized as entertainment products, yet represent an enormous part of the core copyright industries in the United States and elsewhere. Professional sports is the category of entertainment with the lowest level of gender diversity. Almost all of the players, coaches, and staff are male.¹¹⁸ Domination of professional sports by men is driven by numbers as well as cultural preferences. Women's gymnastics and ice-skating may be popular at the Olympic level, but most female competitors who rely on corporate sponsorships for financial remuneration receive less from advertising and base compensation than men.¹¹⁹ Even when women are very visible and successful at professional spectator sports, in team sports, such as soccer,¹²⁰ or individual sports, like tennis¹²¹ or golf,¹²² they are paid less than men.

¹¹⁸ Leah Libresco, *It Only Takes Two Women Coaches for the NFL To Tie for No. 1 on Gender Diversity*, FIVETHIRTYEIGHT (Jan. 21, 2016, 2:40 PM), <http://fivethirtyeight.com/features/it-only-takes-two-women-coaches-for-the-nfl-to-be-no-1-on-gender-diversity>; Matthew J.X. Malady, *Sidelined: Why Are There Still No Women Coaching Men's Sports? And Why Don't We Care?*, SLATE: DOUBLEX (Sept. 28, 2012, 8:45 AM), http://www.slate.com/articles/double_x/doublex/2012/09/female_coaches_why_aren_t_there_more_women_in_charge_of_men_s_teams_.html.

¹¹⁹ Janet S. Fink, *Changing the Game: Untapped Potential*, STREET & SMITH'S SPORTSBUSINESS: J. (Nov. 2, 2015), <http://www.sportsbusinessdaily.com/Journal/Issues/2015/11/02/Opinion/Changing-the-Game-Janet-Fink.aspx>; Taryn Hillin, *Olympian Women Face Bullsh*t Pay Gaps, Too*, FUSION (Aug. 24, 2016, 8:58 PM), <http://fusion.net/story/336332/women-sports-pay-gap-olympics>; see also Suzanne McGee, *Go for Gold, Wind up Broke: Why Olympic Athletes Worry About Money*, THE GUARDIAN (Aug. 7, 2016, 8:00 AM), <https://www.theguardian.com/sport/2016/aug/07/olympic-games-rio-athletes-personal-finance-struggle>.

¹²⁰ Karen Yourish et al., *How Much Less Are Female Soccer Players Paid?*, N.Y. TIMES (Mar. 31, 2016), <http://www.nytimes.com/interactive/2016/03/31/sports/soccer/us-women-soccer-wage.html>; Dave Zirin, *US Women's Soccer Is More Popular than Men's, but the Players Are Still Paid Less*, THE NATION (Apr. 5, 2016), <http://www.thenation.com/article/us-womens-soccer-is-more-popular-than-mens-but-the-players-are-still-paid-less>.

¹²¹ Angelina Chapin, *The Sexism in Tennis Needs To Stop*, HUFFINGTON POST: THE BLOG (Mar. 28, 2016, 2:04 PM), http://www.huffingtonpost.com/angelina-chapin/the-sexism-in-tennis-needs-to-stop_b_9557106.html.

¹²² Max Saffer, *Dollars but No Sense: Golf's Long History of Shortchanging Women*, ESPN (Apr. 8, 2016), <http://espn.go.com/espnw/sports/article/15160220/big-gap-earnings-men-women-professional-golfers>.

Back when women's sports were ill-funded and ignored at the collegiate level, women held most of the coaching positions for women's teams. After Title IX took effect, however, and the positions were more remunerative and had higher prestige, men started taking over the coaching of women's sports teams.¹²³ Title IX certainly helped female student athletes gain enhanced athletic opportunities at the high school and college levels. But for the vast majority of them, a career in professional athletics after graduation is highly improbable, particularly with respect to team sports. Women's sports are usually less popular to viewers than corollary men's sports,¹²⁴ and the idea of mixed-gender professional football, basketball, baseball, soccer, or hockey teams has yet to be explored.

V. SOME CONCLUSIONS: EMPIRICAL DATA IS NEEDED, ABOUT RACE AS WELL AS GENDER

Patent law and copyright law can fairly be said to commodify gender disparities. Patent law and copyright law did not create sexism, but both intellectual property regimes support and solidify the relative economic and social exclusion of women inventors and creators. Affirmatively adding laws and regulations that mandate extensive gender-based data collection by the USPTO and Copyright Office would not immediately improve the situation for women, but would at least measure the extent of the problems on an ongoing basis and offer benchmarks for measuring changes in the status of women compared to that of men.

There is a danger that when women reveal their gender, they will be punished. It is a reasonable fear, supported in some ways by actual data.¹²⁵ A woman may have better prospects for obtaining a patent if she obscures her femaleness by using initials only, rather than a feminine first name, when she

¹²³ See, e.g., Dana Hunsinger Benbow, *Why Has Number of Women Coaches Fallen Since Title IX?*, USA TODAY (Feb. 23, 2015, 10:32 PM), <http://www.usatoday.com/story/sports/college/2015/02/23/women-college-coaches-title-9-ix/23917353>.

¹²⁴ K.S.C., *Why Professional Women's Sport Is Less Popular than Men's*, THE ECONOMIST: THE ECONOMIST EXPLAINS (July 27, 2014, 11:50 PM), <http://www.economist.com/blogs/economist-explains/2014/07/economist-explains-19>.

¹²⁵ See *supra* Part II.

submits a patent application. But surely there are methods of blind data collection that the USPTO can use to track the gender of patent applicants without revealing it to patent examiners.

Similarly, the Copyright Office can require disclosure of the gender of authors who choose to register their copyrights, while keeping this information from being available to the public in a personally identifiable manner, to facilitate the obfuscation of author gender for purposes of privacy as well as avoiding sexism. And surely there are ways that the Copyright Office can unpack the genders of every creative contributor to a copyrighted work for hire, particularly audio visual works such as movies and television shows.

High-quality empirical evidence is needed to track the progress or lack of progress that women make toward some semblance of equality with respect to generating valuable patents and copyrights, and the financial and reputational rewards they confer. Without it, generating the social reaction that meaningful structural changes require will be far more difficult.

The focus of this Essay has been gender, but similar sorts of underrepresentation, discrimination, and exclusion occur as a result of race, with women of color facing what legal scholar Joan Williams refers to as "double jeopardy."¹²⁶ The Copyright Office and USPTO are well situated to document the state of race and gender in the creative and inventive arts. Hopefully they can be persuaded to do so. When the full extent of the effect that girl germs can have is known and documented, this information could provide a powerful impetus for legal and societal changes to help bring women inventors and authors into productive parity with men.

¹²⁶ See generally WILLIAMS ET AL., *supra* note 32.